



# THE LANGLEY DAAC

## *n e w s l e t t e r*

### The MISR Project

**MISR**—the Multi-angle Imaging Spectro-Radiometer—is scheduled for launch aboard the Earth Observing System (EOS) flagship *Terra* this summer. *Terra*'s orbit will be near-polar, sun-synchronous, with a 10:30 AM Local Time equator crossing time on the descending node, and will have a 16-day global coverage repeat cycle.

Containing 328 pounds of wires, lenses, silicon wafers, and metal supports, the MISR instrument is one of five instruments that make up the scientific core of NASA's first EOS satellite. The instrument has nine high-performance, solid state cameras, each pointed in a different, precisely determined direction. Autonomous systems supply each camera with power, heating, and cooling. And there are separate data streams to control each camera, monitor its vital signs, and process the data each camera produces.

While most satellite instruments look only straight down or toward the edge of the planet, MISR will image each piece of the Earth's surface with all nine cameras, in each of four wavelengths (blue, green, red, and near-infrared).

The role of MISR is to measure the sunlight scattered in different directions under natural conditions. This will help quantify the amount of solar energy that heats the Earth's surface and atmosphere, and the changes that occur in these quantities over the six-year nominal lifetime of the instrument.

MISR will monitor changes in surface reflection properties, in aerosol particle amount and type, and in cloud properties. These data will then be used to study the effects of land use changes, air pollution, and volcanic eruptions, as well as processes such as desertification, deforestation, and soil erosion. As part of the EOS program, computer models that predict future climate will be improved by the results of these studies.

For example, computer simulations show that when viewing commonly occurring particles under

favorable conditions, MISR can distinguish spherical from non-spherical particles, and can identify small, medium, and large sizes, as well as dark and light coloration. This suggests that MISR will identify air masses containing different particle types as they move around the planet—a major step beyond simply estimating particle amount for entirely assumed aerosol properties, which is state-of-the-art for global satellite retrievals today.

The MISR science team is working with colleagues who study the atmosphere from the ground and from instrumented aircraft, and these field observers will take measurements at several sites. By combining these measurements with the MISR data, the scientists hope to get a complete global picture of the direct impact aerosols have on Earth's radiation budget.

Ten years of planning, designing, building, and testing have been performed to ensure the MISR instrument can withstand a rough launch, a harsh space environment, and still send back the information desired. The first images received will be the beginning of an era of scientific investigation and learning for which the instrument was planned and built.

The standard data products will be generated using software developed by the MISR Instrument Team at the Jet Propulsion Laboratory in Pasadena, California, and the data products will be processed, archived and distributed at the NASA Langley DAAC. Announcement of data availability will be made soon after launch.

More detailed information on the MISR Project can be found on their Home Page at

<http://www-misr.jpl.nasa.gov>

[Based on the article by Ralph Kahn, *Air&Space Smithsonian*, August/September 1998]

The

MISR

Project

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## Coming Soon!

### Aerosol Trading Cards

The Data Center plans to release another set of science trading cards in the near future. While the first set of trading cards explained the Earth's Radiation Budget using the ERBE Project, the Aerosol trading cards use the SAGE I and SAGE II projects to focus on why atmospheric aerosols—volcanic, desert dust, and human-made—have a direct and indirect effect on the Earth's radiation budget.

The set of six Aerosol trading cards will be accompanied by lesson plans, experiments, and cumulative activities to assist elementary and secondary school students and teachers, as well as the general public, learn about Earth Science.

Future sets of trading cards are planned by the Data Center and will focus on Tropospheric Chemistry (greenhouse gases, ozone, and layers of the atmosphere) and Clouds.

Visit our Educational Web Page for more information on the trading cards and other education-related activities:

<http://eosweb.larc.nasa.gov/EDDOCS/>

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## Workshops/Science Team Meetings

The Langley Atmospheric Sciences Data Center participated in several workshops/science team meetings during the past several months.

Personnel participated in the NARSTO workshop on Fine-Particle Characterization and Atmospheric-Process Research held in Crystal City, Virginia, on January 27-29, 1999. NARSTO (<http://www.cgenv.com/Narsto>) is a public/private partnership whose membership spans government, industry, and academe in Canada, Mexico, and the U.S. Originally focusing on the tropospheric ozone issue, NARSTO has expanded its research interests to include fine-particle pollution. The primary workshop goal was to accumulate scientific input for use in developing a strategic plan for fine-

particle research in the atmospheric sciences. The workshop was organized around three fundamental themes: designing a research program to maximize product use by the user communities; implementing a system that optimizes product-delivery channels to these communities; and ensuring that data generated within the program are subjected to downstream analysis in an expedient and cost-effective fashion. The Langley Data Center is the designated archive site for NARSTO data related to tropospheric ozone and is expected to serve a similar role for the fine-particle research data.

Members attended the joint Science Team meeting of the First ISCCP (International Satellite Cloud Climatology Project) Regional Experiment (FIRE) and the Surface Heat Budget of the Arctic Ocean (SHEBA). The meeting was held January 25th through the 29th in Tucson, Arizona. A presentation outlining current archival status was shown to the Data Management Working Group. Discussions with several data providers to finalize data transfer plans were held. Preliminary planning for the next FIRE field campaign, Cirrus Regional Study of Tropical Anvils and cirrus Layers (CRYSTAL) was begun.

A staff member participated in the Stratospheric Aerosol and Gas Experiment III (SAGE III) Science Team meeting in Tucson, Arizona, on February 25th and 26th. A demonstration was given on how to access the SAGE III data products through subscriptions. The SAGE III testing schedule at the Data Center was also presented. Possible collaboration of Outreach efforts was discussed.

Staff members attended the Clouds and the Earth's Radiant Energy System (CERES) Science Team Meeting in Williamsburg, Virginia, on April 27th through 29th. Validation, instrument status, and Terra (EOS AM-1) launch were among the topics of discussion for the meeting.

Representatives also participated in the first post-selection Science Team meeting for the PICASSO-CENA project on May 18th and 19th. Information about the LaTIS data processing environment was provided for a presentation on mission operations, and discussions were held with the PICASSO-CENA outreach team from Hampton University as well as with members of the CloudSat project team who were present for joint mission planning. A tour of the DAAC was given at the close of the meeting.

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## Recent Research

## New Data Available

## Recent

Research on satellite remote sensing of fire and smoke by Dr. Sundar A. Christopher is featured in a poster created for display in the Langley DAAC exhibit booth for the Spring AGU meeting. Dr. Christopher is a professor with the Department of Atmospheric Sciences at the University of Alabama in Huntsville. Using his research entitled "The Central American Fires from Space: Intercomparison of Satellite Products," the poster includes sample images from CERES and VIRS of the major Mexican fire event in April-May, 1998.

## Research

The CERES shortwave flux and VIRS imagery are used together to address cloud and aerosol radiative forcing issues and to help understand the impact of aerosols on the earth-atmosphere system. This combination of sensors highlights the different features of the smoke and fire event, from the UV region of the electro-magnetic spectrum to the thermal infrared.

Dr. Christopher's research and imagery are available from our homepage under "Recent Research" and at <http://www.atmos.uah.edu/~sundar/camerica.html>

## New Data

Another recent project featuring data from the Langley DAAC is the **ERBE Data Visualizer**. The Institute on Climate and Planets (ICP) web site has used the ERBE data set on CD-ROM to create a data visualizer, primarily for use by teachers and students involved in a science education program. The ICP is a research, science education, and minority outreach program at the Goddard Institute for Space Studies (GISS) in New York. The ICP involves pre-college and undergraduate students in current NASA climate and planetary investigations in collaboration with teachers and faculty from their schools and colleges, and GISS research scientists.

The Visualizer uses a Java applet that allows interactive viewing and manipulation of the ERBE satellite data in order to examine in detail the Earth's radiation balance. An educational activity is available which uses the Visualizer within the context of studying Earth's radiation balance.

The ERBE Data Visualizer is available from our home page under "Recent Research" and from ICP at <http://icp.giss.nasa.gov/research/data/erbe/>

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## POAM2\_VER6

The Polar Ozone and Aerosol Measurement II (POAM II) instrument was developed by the Naval Research Laboratory to measure the vertical distribution of atmospheric ozone, water vapor, nitrogen dioxide, aerosol extinction, and temperature. POAM II measures solar extinction in nine narrow band channels, covering the spectral range from approximately 350 to 1060 nm. Solar extinction by the atmosphere is measured using the solar occultation technique; the sun is observed through the Earth's atmosphere as it rises and sets as viewed from the satellite. POAM II was launched aboard the French SPOT-3 satellite on 26 September, 1993 and retrieved data until satellite failure in November 1996. (74 files, 30,363KB)

## FIRE\_ACE\_ER2\_MIR

The First International Satellite Cloud Climatology Project (ISCCP) Regional Experiment (FIRE) - Arctic Cloud Experiment (ACE) was conducted April through July of 1998. It was held in conjunction with the Surface Heat Budget of the Arctic Ocean (SHEBA) Experiment. FIRE-ACE focused on the all aspects of Arctic cloud systems. The Millimeter-wave Imaging Radiometer (MIR) as configured for the FIRE-ACE experiment is a seven channel scanning radiometer. It was flown onboard the NASA ER-2 aircraft. The MIR has primarily been used for the study and development of techniques for retrieving water vapor distributions. More recent studies have focused on the application of the MIR frequencies for the measurement of clouds and the effects of clouds on the retrieval of atmospheric water vapor. The FIRE-ACE experiment was an excellent opportunity for extending the data set for such analyses. (22 files, 216,564 KB)

## LASE\_CAMEX\_3

LASE (Lidar Atmospheric Sensing Experiment) is an airborne autonomous DIAL system developed to measure water vapor and aerosol profiles. The Convection And Moisture EXperiment (CAMEX-3) campaign was based at Patrick Air Force Base, Florida from 6 August - 23 September, 1998. CAMEX-3 successfully studied Hurricanes Bonnie, Danielle, Earl and Georges. CAMEX-3 collected data for research in tropical cyclone development, tracking, intensification, and landfalling impacts using NASA-funded aircraft and surface remote sensing instrumentation. The CAMEX-3 study yields high spatial and temporal information of hurricane structure, dynamics, and motion. The LASE instrument's purpose in this experiment is to characterize the hurricane environment using water vapor and aerosol measurements for use as input to models and assimilation schemes and to fill in sonde data voids. (20 files, 86,704KB)

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## PUBLICATION ACKNOWLEDGMENT:

The requested form of acknowledgment for any publication in which Langley DAAC data are used is: "These data were obtained from the NASA Earth Observing System Data and Information System, Distributed Active Archive Center at the Langley Research Center."

We request two reprints of any published papers or reports which cite the use of our distributed data. And to assist us in providing the best service to the scientific community, we also request notification if the data are transmitted to other researchers.

## ACCESSING DATA:

The Langley DAAC provides multiple interfaces to access its data holdings. The graphical and character user interfaces allow users to search and order data. Web interfaces allow direct access to some data holdings for immediate downloading, for placing media orders, for searching the data holdings, and for ordering prepackaged CD-ROMs and videocassettes. All of these methods are easily accessible from the Langley DAAC web site at:

<http://eosweb.larc.nasa.gov>

## Data

The Langley DAAC Newsletter is a quarterly publication of the Langley Distributed Active Archive Center, NASA Langley Research Center, Hampton, VA 23681-2199. Contributions, comments, or questions are welcomed and may be submitted to the Langley DAAC User and Data Services office by phone at (757) 864-8656, by FAX at (757) 864-8807, or via e-mail at [userserv@eosdis.larc.nasa.gov](mailto:userserv@eosdis.larc.nasa.gov).

The Langley DAAC Newsletter is now available on-line at  
<http://eosweb.larc.nasa.gov/>

You will need a PDF reader such as Adobe Acrobat  
 to open and view the Newsletter.

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### Upcoming Events:

American Libraries Association Annual Conference  
 New Orleans, Louisiana  
 June 26-29

AMS 10th Conference on Atmospheric Radiation  
 Madison, Wisconsin  
 June 28-July 2

Terra (AM-1) Launch  
 Vandenberg Air Force Base, California  
 July 28 (tentative)

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The Langley DAAC is planning to expand the online, PDF Version of the Newsletter in the near future to include hyperlinks to URLs mentioned in the articles and images. An Electronic Subscription Service is also planned. Please let us know if you are interested in this expanded version or if you wish to continue to receive the hardcopy version of the Newsletter. Our e-mail address is:

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